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COMMONWEALTH PHYTOPATHOLOGICAL NEWS

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SPRAYING TECHNIQUES: CONCENTRATE SPRAYING

[Condensed from an article by M. H. MOORE of East Malling Research Station in AGRICULTURE, March, 1957.]

The term 'low-volume spraying' has become accepted in Britain to designate the new technique of controlling pests and diseases by use of much smaller volumes than in normal hydraulic spraying. In Canada and the U.S.A. 'concentrate spraying' is also used, but in England this term is reserved for a very high concentration of spray at a very low volume; for example, a concentration of ten times more and a volume about one-tenth of what would be used in the normal hydraulic equivalent.

These concentrated sprays do not give much better control than efficient high-volume application, but have numerous advantages; not least the saving of costs. Spraying time is increased by elimination of constant journeys to the water supply and waste of time in filling tanks. Smaller machines can be used which are more manoeuvrable and less likely to pack the soil — 100 gallons of water weighs nearly half a ton. The chief disadvantage is the more distant drift of small droplets of a mist-blown spray, especially in orchards, which increases the hazards to man if very poisonous sprays are used.

From the point of view of the scientist this increase in drift is also a disadvantage if it is desired to lay down a spraying trial in plots, as the very broad drift barriers made necessary may increase the area required to unmanageable proportions. To overcome this, basic experiments may be carried out on small trees with small-scale spray machinery, using individual trees as 'plots'. However, when it is desirable to test new methods quickly, the spraying of larger areas without replication may well serve for practical purposes to point the way and find early answers to some of the growers' questions. The low-volume technique has thus been largely developed by this approach, for the practical application of results obtained on small trees must first be tested on a larger scale.

Low-volume spraying has probably come to stay, and chemicals and machines are being adapted and developed to meet it, the 'know-how' having so far been

largely acquired by trial and error in the field. Many thousands of acres of fruit have now been sprayed at medium concentrations of spray and volumes of some 25 to 50 gallons an acre, about a tenth of the gallonage required by the hydraulic method, but there is as yet less orchard experience in England of really concentrated spraying at even lower volumes, though machines suitable for it are now being produced.

A basic fact that has emerged from the research approach to the problem is that successful control of pests and diseases depends mainly on the dosage of chemical, that is to say, the amount of undiluted concentrate per acre, regardless of the volume carrying it, so long as satisfactory coverage is achieved. For instance, lime sulphur controls apple scab at an optimum dosage of 3 gallons an acre on small trees not over seven feet high, when sprayed with droplets averaging 30 to 40 microns in diameter, applied in compressed air with a paint gun. Dilution of the lime sulphur with water up to eight times its volume produced the same result. Trials with lime sulphur have also shown that spray damage depends less on concentration of material than of its concentration in relation to its volume. Increase of spray volume in relation to dosage increased the likelihood of droplets coalescing into pools or films on the leaf surface. Maximum concentrations remain safe provided that the droplets remain discrete.

Droplet size, always important, is the more so with the lowest volumes. The volume of a droplet increases eightfold as its diameter is doubled, so that for the same volume of spray, droplets of 100 microns diameter will be only one-eighth as numerous as those of 50 microns. The machines for the lowest volume work will, therefore, give efficient coverage only if they produce mists of small droplets, and it is in these factors that the distinction lies between low-volume and concentrate spraying.

There are limitations to the reduction in droplet size, because the smaller the droplet, the greater the force needed to impact it, and the more likely it is to go astray en route. In practice a limit is reached with droplets some 40 to 50 microns in diameter, and the cost of machinery to produce smaller droplets would be too great. In warm climates where droplets would tend to evaporate before impaction the minimum size may have to be substantially greater. Where larger droplets and therefore larger spray volumes are applied the risk is increased of droplets containing fairly high concentrations of chemicals not remaining discrete. The quicker the droplets dry, the more likely is the spray to prove non-phytotoxic.

Though the general principals of low-volume spraying are clear it is not yet possible to say which, if indeed any one, low-volume level is likely to prove of most practical value. Much depends on environment, type of crop, the efficiency of the machine, and above all, the economics of the operation. Dosage per acre of chemical is the best guide, given efficient coverage. On this basis the concentration of spray at any volume level can be calculated from what is known to give good control at high volume. This basis serves as a reasonable practical guide, though it must be remembered that medium volumes at medium concentrations of some chemicals may prove more phytotoxic than lower volumes at higher concentrations.

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with cellophane-coated glass rods of aquatic Hyphomycete spores in streams were shown by J. Webster and H.P. Clark (Sheffield). C.T. Ingold (Birkbeck College) exhibited an apparatus for determining the hourly rate of spore discharge during a twenty four hour period.

Trichophyton Antigens by specific precipitation in agar was shown by means of specimen plates containing antigen-antibody precipitation lines by J.G. Feinberg, H. Grayson, and D. Lawson (Beecham Research Laboratories). J.H. Hawkins (Bristol) displayed photographs demonstrating the seasonal occurrence of epiphytic 'sooty moulds' on living leaves. Pure cultures of polycentric Chytrids obtained from decaying lake vegetation were shown by L.G. Willoughby (Freshwater Biological Association). P. Dixon (Birkbeck College) demonstrated the life cycle of Ascocybe grovesii, and an additional demonstration by the College was Derxia, believed to be a new genus of the Sporobolomycetaceae.

J.T. Palmer

DOTHIDELLA-RESISTANT HEVEA CLONES

Establishment in Malaya

There are now 20 acres at the Rubber Research Institute Experiment Station budded with clones resistant to Dothidella ulei, the causal fungus of South American leaf blight. This is the result of an exchange of planting material organised between the Rubber Research Institute of Malaya and the Instituto Agronomico do Norte, Brazil. Twenty-five high-yielding Malayan clones suitable for breeding in Brazil to combine with leaf blight resistance were exchanged for twenty-five Brazilian clones suitable for breeding in Malaya to combine with high yield. Five of the Brazilian clones are suitable for use for top-budding should South American leaf blight appear before a clone combining high-yield and resistance had been bred.

Fig. 1. Field trial of DR clone F2784 in Jan. 1957.

With Dothidella confined to the American continent, a breeding station would have had to be established there had the Brazilian clones not been available, involving years of delay and considerable expense. Even if there had been a Dothidella area sufficiently close to Malaya to establish a breeding station under the surveillance of the R.R.I., the Brazilian clones still would have been invaluable to the Far Eastern Rubber Industry, as they represent the results of several years work with material of much more variable genetic origin than has been available in Malaya in the past.

It was out of the question to make direct imports from a Dothidella area, so a place where clones from Brazil could be grown in intermediate quarantine was sought. This was provided by the United States Department of Agriculture at their plant introduction garden at Coconut Grove, Miami, Florida, an area outside the American tropics where rubber would grow. Although growth was poor, it was much better than could be expected under glass at Kew, an alternative that had been envisaged at one time. After cutting and treatment at Miami budwood was sent to the Commonwealth Mycological Institute at Kew, disinfected, repacked and sent on to Malaya. Four consignments were sent, of which full details are given by C.W. Brookson in Communication 298 of the JOURNAL OF RUBBER RESEARCH INSTITUTE OF MALAYA.

The clones were budded in a nursery on the R.R.I. premises (fig. 3), where the plants could receive daily attention and frequent inspection. The risk that an imported disease might appear on these plants or on seedlings of Malayan origin growing next to them, was considered

Fig. 2. Field planting of DR clone F1619 top-budded to the high-yielding Eastern clone Tj1 (Jan. 1957).

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FROM NEAR AND FAR

The East Malling Research Station Association has instituted an annual award of a three-year studentship valued at £500 a year (tax free), to be called the V. H. Blackman studentship, tenable at East Malling for research on the physiology of perennial fruit plants.

The University of Leeds in 1929 had 1,750 students, of whom 560 were studying science. In 1956 the corresponding numbers were 3,700 and 1,700 and it is expected that by 1962 there will be an expansion to 5,300 and 3,000. An appeal for funds for a big building programme to meet these needs is being launched.

Among projects supported by the Nuffield Foundation grants for 1955-6 were investigations of (1) the modification by chemical means of radiation effects in plants, (2) a possible chemical basis for genetical crossing-over by the study of micro-organisms, and (3) the construction of a micro-manipulator transmitting a sense of touch.

The use of nylon as a substitute for rabbit fur in the linings of Batchelors' hoods of Oxford University has now been disallowed. Nylon was introduced during the war when rabbit fur was unobtainable, but Congregation consider that today, despite myxomatosis, rabbit fur is neither too difficult to obtain nor too expensive to warrant a departure from the rules prescribed in the register prepared by the Oxford branch of the National Federation of Master Tailors.

Following the announcement last year of a substantial grant to Birkbeck College, London, for research on a translating machine, news has now been received of an automaton which can read at the rate of 120 characters a second. It is known as ERA (no prizes for correct guesses) and is made by Solarton, of Dorking, Surrey. It can scan annual reports, bank statements and similar documents and collate the information much more rapidly than can be done by a human being.

The 4th International Congress of Crop Protection will be held in Hamburg from September 8 to 15, 1957. Further particulars from the secretary, Biologische Bundesanstalt für Land- und Fortwirtschaft, Messeweg 11/12, Braunsweig, Germany.

A forest pathologist in America has been awarded compensation for injuries received whilst taking a bath, the courts ruling it an occupational hazard in that he was required to be 'neat' whilst attending a conference as a representative of his employers.

Publications of Interest

The British Council have issued the 58th edition (1956) of SCIENTIFIC AND LEARNED SOCIETIES OF GREAT BRITAIN, 211 pp., London, George Allen and Unwin, 35s. This is a very useful book of reference.

UNESCO has published a second volume of SCIENTIFIC INSTITUTIONS AND SCIENTISTS IN LATIN AMERICA; this time on Colombia. It comprises ii + 176 pp., with a subject index and alphabetical arrangement for scientists and institutions. (Centro de Cooperacion Cientifica para America Latina, Montevideo, 1956.)

TECHNICAL REPORT SER. 1956 NO. 114, 51 pp., H.M. Stationery Office, London, 3s. 6d., issued by WHO deals with the toxicity of pesticides, especially those based on Cl and P, to man and higher animals. It describes safeguards and says where research is being done.

BRITISH SCIENTIFIC AND TECHNICAL BOOKS 1935-52, published by Aslib (James Clarke, London; Hafner, U.S.A.) at 63s., lists recommended books published in G.B. and the Commonwealth in the years 1935 to 1952. (22 pp. on agriculture (plants); 5 pp. botany; 7 pp. biological sciences.)

The C.M.I. Culture Collection Catalogue, 2nd edition (1957), 75 pp., photo-

offset, has been produced in its entirety at the Institute. It is now on sale, price 7s. 6d., post free.

Part 2 of the Cumulative Index to Petrak's Lists (1920-1939) comprising host and substratum indices is now available from C.M.I. price 20s., post free. This completes the cover of fungus names from Saccardo to 1940.

THE NEW ZEALAND JOURNAL OF SCIENCE & TECHNOLOGY will cease publication in December 1957. From that date it will be replaced by N.Z. JOURNAL OF AGRICULTURAL RESEARCH (bimonthly), N.Z. JOURNAL OF GEOLOGY AND PHYSICS (quarterly), and N.Z. JOURNAL OF SCIENCE (quarterly). It is hoped that articles on Plant Pathology will now receive better circulation overseas through being divorced from the physical sciences and agriculture.

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negligible. However, the regular inspections did serve to reassure the industry that every precaution was being taken.

In order that the number of consignments of planting material from the American tropics should be cut down to the minimum the R.R.I. of Malaya in 1955 distributed budwood of the resistant clones to sister organisations in Ceylon, Indochina, and Indonesia. At the same time budwood was sent to the R.R.I. Experiment Station

Fig. 3. Buddings of Hevea at R.R.I. nursery (Oct. 1953) four months after the budwood left Miami

at Sungei Buloh, Selangor. Here it was budded for field trials (fig. 1). The clones known to be suitable for this purpose were top-budded on to high-yielding Malayan clones (fig. 2).

The introduction of the clones is a policy of insurance only. There are plans to distribute Dothidella-resistant budwood and to attempt to eradicate the disease should it appear, but this has meant no relaxation of the measures taken to exclude the disease from South-East Asia. There has been international cooperation to this end and a Plant Protection Agreement for the South-East Asia region has recently been concluded.

Puzzling New Oil Palm Disease: ".... two of the inoculated seedlings developed last Bleaf symptoms" — from a recent paper.

BRITISH MYCOLOGICAL SOCIETY CONVERSAZIONE

A Conversazione was held in the Botanical Laboratory of Birkbeck College, University of London, on the 16th March, 1957. 32 demonstrations were given by some forty-one members covering a wide range of subjects, varying from decomposition of cellulose film in soil to a display of Gasteromycetes.

The life histories of two Pyrenomycetes with similar Gliocladium spores were demonstrated by C. Booth and A.H.S. Brown (C.M.I.). S.M. Francis (Imperial College) exhibited ten species of the Lophiostomataceae recorded for Britain. The spores take several months to mature and, as septation and colour have been used as the basis of the genera, there is consequently considerable confusion in the group. However, by making monthly collections, combined with study in culture, it is hoped to obtain a clearer conception. Observations on two marine Pyrenomycetes (Mycosphaerella ascophylli and Orcadia ascophylli) on Ascophyllum nodosum were illustrated by F.C. Webber (Aberystwyth). W. Page (Birkbeck College) demonstrated two new British records of coprophilous Pyrenomycetes from rabbits' pellets (Pleurage fimbriata and Sordaria barbata).

C.G. Dobbs (Bangor) showed a mysterious tertiary fungal parasite of an unknown spider attached to a fern leaf (the only organism which could be identified with certainty) and R.F. Haslam (London) demonstrated several parasitic associations of micromycetes which do not appear to have been observed before.

M. Kostrawicka (Cambridge) gave observations on the interaction between Phytophthora infestans and Rhizoctonia solani on being grown together on halved potato tubers, and when R. solani is introduced into a culture of P. infestans. G.A. Salt (Rothamsted) illustrated the relationship between skin-spot, eye-infection, and brown cortical rot caused by Oospora pustulans on potato plants.

D.A. Perry (Rothamsted) showed how the inoculation of Fusarium solani f. pisi delayed the wilt symptoms of peas caused by F. oxysporum f. pisi. O.M. Stone (Glasshouse Crops Research Institute) demonstrated the culture of cucumbers and other plants under sterile conditions in large test tubes for cross-inoculations with mildews. G.M. Waterhouse (C.M.I.) gave a comparison of Dicksonomyces sorghi nov. gen. and sp. with Rhinotrichum tenellum.

Aspects of particular interest to foresters were a demonstration of Meria laricis on European, hybrid and Japanese larches by P. Biggs (Southampton), modes of canker production in European larch caused by Trichoscyphella willkommii by J.G. Manners (Southampton), a demonstration of fungi on pine stumps, including variations from the normal pattern of colonization due to chemical treatment, by J. Rishbeth and D.S. Meredith (Cambridge), and a Hirsutella sp. recently isolated from the spruce budworm (Cheristoneura fumifera) by H.W. Buston and T.C. Loughhead (Imperial College), which may have value for the biological control of the insect.

The Forest Products Research Laboratory demonstrated Stereum subpileatum in the staves and heads of oak casks which has caused tainting of beer by the production of 5-methoxycoumarone, Asterostroma ochroleucum, which causes the decay of timber in buildings, and isolates of three thermophylic fungi from moist sawdust maintained at 48°C.

J. Bywater (Bangor) showed the inhibition of spore germination on cellulose film buried in soil. S.D. Garrett (Cambridge) illustrated the increase of Trichoderma viride in soil fumigated with carbon disulphide, which can be macroscopically demonstrated by the burial of the woody inocula of Armillaria mellea in the fumigated soil as it stimulates growth and sporulation of T. viride. J.S. Waid and M.J. Woodman (Merlewood Research Station) showed a technique for studying hyphal activity in soils. Grids of nylon mesh are buried in the soil for several months, in which time they become colonised by fungal mycelia and the grids facilitate the microscopic counting of the hyphae. H.T. Tribe (Cambridge) exhibited a selection of microscopic slides illustrating the colonization of cellulose film by microorganisms.

The life cycle of Coprinus lagopus from a genetical point of view was demonstrated by D. Lewis and P.R. Day (John Innes Horticultural Institution), drawing attention to features of the mono-, hetero-, and dicaryon forms of this agaric, which are very convenient for genetical investigations.

Apparatus for obtaining spore deposits of Basidiomycetes was demonstrated by J.L. Gay, S.A. Hutchinson, and J. Taggart (Glasgow). Trapping experiments

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STOLBUR AND SIMILAR DISEASES

J.M. Todd, Scientific Services, Department of Agriculture for Scotland

The purpose of this note is to give an appreciation of a conference on stolbur and similar diseases which I was privileged to attend in September, 1956, through the kindness of the Slovak Academy of Science. The formal part of the conference, lasting two days, took place in the castle of Smolenice in the lower Carpathians. This was preceded by four days of touring through much of Slovakia; included was a visit to the extensive hot springs and spa of Pieštany and an ascent (by rope railway) of a high peak in the Tatra Mountains, which separate northern Slovakia and Poland.

There were seventy participants - plant pathologists, entomologists, chemists,

Some of the conference members in the Tatra mountains

agriculturalists and representatives of the interested government departments. The other foreign guests were M. Panjan (Yugoslavia), J. Szirmai (Hungary) and A. Hein representing M. Klinkowski (Germany). J.C. Kovačevski (Bulgaria) and K.S. Sukhov (U.S.S.R.) had also been invited but were unable to attend. One of the three presiding members was Dr. C. Blattny, doyen of plant pathologists in Czechoslovakia.

The Stolbur Concept

The reason for my own attendance was to talk about witches' broom of potatoes and I went to Czechoslovakia with a comprehension of stolbur more or less limited to the REVIEW OF APPLIED MYCOLOGY equation of the disease with tomato big bud. Actually stolbur should be thought of not so much as a hard and fast disease, like, say, potato leaf roll, but rather as the occurrence in the natural flora of a virus which is seasonally transmitted to crops, particularly solanaceous plants. The term is Russian and signifies the sterility of the fruits, which is a symptom in tomato and tobacco. Symptoms differ according to the host. In the classical natural host, Convolvulus arvensis, there is much bud proliferation, some discoloration of foliage and alteration of leaf shape and very often failure to flower. In potato the symptoms closely fit those of purple top wilt caused by aster yellows virus in North America and tomato big bud virus in Australia and for long were attributed to a fungal pathogen such as Colletotrichum atramentarium. In paprika, also, severe wilting is brought about as if a vascular pathogen were operating. In tomato the stems stop growing and become thickened, axillary shoots grow out, new leaves are short and curved and there is gross malformation and virescence of the flowers, as with big bud. In tobacco the upper leaves are smaller than usual and somewhat rugose and the flowers are small, virescent and infertile.

(To be continued in July)

PERSONAL NEWS

Visitors to C.M.I.

Among overseas visitors were Miss M.B. Morris, Trinidad; Dr. J.T. Slykhuis and E.A. Peterson, Canada; Dr. Kahn Jalavicharana, Thailand; R.L. Munjal, India; Dr. Sharif, Iran; R.E. Wyatt, Northern Nigeria.

Miss Morris and Mr. Munjal have spent some months working in the Herbarium.

Appointments, Promotions, Retirements etc.

The Overseas Service Division of the Colonial Office announce the following appointments: H.K. Ashby, assistant director of agriculture (field), Malaya; G.D. Badger, assistant director of agriculture (field), Uganda; Dr. J.W. Blencowe, senior plant pathologist, WACRI., Ghana; P.A. Chang-Choong, assistant director of agriculture (field), Malaya; D. Kay, plant pathologist, WACRI, Ghana; N. Lambert, deputy director of agriculture, Fiji; H.C. Miller, director of agriculture, Jamaica; H.J. Simpson, deputy director of agriculture, Malaya; W.G. Stuart, deputy director of agriculture, Jamaica; and R.J.M. Swynnerton, director of agriculture, Kenya.

Sir Joseph Hutchinson has been elected to succeed Sir Frank Engledow as Drapers professor of agriculture, Cambridge, when the latter retires next October.

Prof. W.H. Pearsall, Quain professor of botany at University College, London, has retired and is succeeded by Dr. D. Lewis from John Innes. Prof. Pearsall, it will be recalled, is also editor of the ANNALS OF BOTANY.

Sir Samuel Wadham has retired from the chair of agriculture at Melbourne University and is succeeded by Dr. H.C. Forster from CSIRO cereal research.

Dr. C.J. Magee, chief biologist of New South Wales, has returned to Australia after a visit to the Philippines to advise FAO on the control of Manila hemp mosaic.

C.A. Thorold, who recently retired from Nigeria, is now in charge of Woburn Agricultural Experiment Station, Bucks.

Miss J.M. Dingley of Plant Diseases Division, Auckland, left New Zealand at the beginning of February. She will continue her studies on the taxonomy of fungi under E.W. Mason at C.M.I., Kew, and also at the British Museum, and R.B.G.

Dr. R.E.F. Matthews, head of virus research at Plant Diseases Division, Auckland, returned to New Zealand towards the end of last year after four years at the Molteno Institute, where he was working on the biochemistry of viruses. He is continuing his work on the chemistry of nucleic acids in relation to virus multiplication and is investigating the possibility of control by the use of pyrimidine analogues.

Awards

Sir Ian Clunies Ross, chairman of CSIRO, Australia, has been awarded the gold medal of the Royal Agricultural Society of England for distinguished service to agriculture.

A.D. Thomson of Plant Diseases Division Laboratory at Lincoln has been awarded a National Research Fellowship by the New Zealand DSIR. He will be studying under Dr. Kenneth M. Smith of the Molteno Institute, Cambridge, England.

OBITUARY

Henry J. Howard who died recently in Norwich after a road accident will be greatly missed by all those interested in the Mycetozoa. Howard was for many years a close friend of Miss G. Lister and when she died he inherited her notes and collections. He himself was a world authority on the Mycetozoa and named all recent collection of those sent to the C.M.I. for identification.

OVERSEAS NEWS

NOTES FROM CANADA

Co-ordination of Research in Canada

In a country as large as Canada where workers are separated from their scientific colleagues by formidable distances, the development of an organized programme of research presents special difficulties. To develop a better integrated programme, a procedure that has been gaining favour is to permit workers engaged in related problems to meet regionally at fairly regular intervals when they may discuss their work and plan their future activities.

Undoubtedly the most successful regional conferences so far organized in Canada have been under the Associate Committees of the National Research Council in close collaboration with the Canada Department of Agriculture. These Committees meet together annually in February in either Winnipeg, Saskatoon, or Edmonton to review a considerable portion of the agricultural research programme in the Prairie Provinces. The idea stems from an historic meeting held in Winnipeg in 1924.

In the early 1920's it was evident that the wheat rust problem was the most acute single problem facing agriculture in Western Canada. In 1924 on the initiative of the National Research Council an Associate Committee on Cereal Grain Research was organized under the joint chairmanship of Dr. H.M. Tory, President of the Council, and Dr. J.H. Grisdale, Deputy Minister of the Dominion Department of Agriculture. A conference was held in Winnipeg to which were invited not only all Canadian research workers interested in the control of wheat rust but also several noted American investigators. As a result of this conference a comprehensive programme was adopted and the Department of Agriculture took steps to establish the Rust Research Laboratory at Winnipeg. Several years later, to provide a broader base, three associate committees were organized, one on plant diseases, another on plant breeding and a third on grain research. To review progress and plan for future research, these committees have met annually except during World War II. The meeting in 1957 at Saskatoon is the twenty-fifth for the Associate Committee on Plant Diseases.

The work of the committees has been greatly facilitated by having much of the detail reviewed and many of the decisions taken by small groups of workers organized in standing sub-committees, each with its own chairman chosen by the group. Such an organization permits the maximum exchange of ideas between workers interested in the same problem or related problems. In the Associate Committee on Plant Diseases there are eight such standing sub-committees. Some, such as the ones on smuts, root diseases of cereals, and diseases of forage crops, are concerned with the exchange of information on specific diseases or groups of diseases and in the integration of their respective programmes. One of the last sub-committees to be organized was one on plant physiology, comprising physiologists and chemists engaged in investigating host-parasite relationships for a few selected pathogens. The sub-committee on varieties and disease reaction performs a very practical service to the plant breeders, for its duty is to assess the data that have been collected on the disease reaction of promising hybrid lines under review by other committees for their agronomic and quality possibilities. This sub-committee also plans these tests, which entail a great deal of detailed work. Other sub-committees are concerned with seed treatments, antibiotics, and microbiology. One day is set aside entirely to sub-committee work.

Each sub-committee reports to the main committee on the salient points of its discussion. In this way the committee as a whole is kept informed, and where changes of a policy nature are recommended, these are debated and disposed of before the whole committee.

Subjects of more general interest are reported before a regular session of the Associate Committee. Usually a half day is also devoted to a symposium on some timely subject. As the current meeting was the silver jubilee of the present committee, Dr. C.S. Holton, a noted investigator of smut diseases of cereals in the United States Department of Agriculture, and Dr. G.W. Fischer, head of the department of plant pathology of Washington State College, Pullman, Washington, and the leading American taxonomist of the smuts, were invited to contribute.

Matters of general interest to the Associate Committees on Plant Diseases and

Plant Breeding are usually presented before a joint session of the two committees.

Finally under the auspices of the Prairie Regional Committee, National Research Council, a brief conference is held on the final day, members of the participating Associate Committees attending. The chairman of the respective committees report briefly on the activities of their own committee and matters of policy are debated. This meeting provides a very valuable forum where divergent views are thoroughly aired. When a workable compromise is not reached, the matter is usually referred to a special group for further study and report.

These meetings thus afford a real opportunity for individuals to exchange information with their fellows and to plan any co-operative work. Moreover, with their greater appreciation of the problem as a whole, they become better team workers.

I. L. Conners

NEWS FROM NEW SOUTH WALES

Foot Rot and "Scab" of Wheat: Until recently this disease was unrecognised in Australia. In 1951 a crown and root rot disease caused by Fusarium sp. was recorded on the Darling Downs, Southern Queensland, and has since been present there in varying intensities each season, being particularly severe in 1955. In Queensland the disease has been studied by T. McKnight, who states that while the pathogen may cause a pre-emergence rot and a seedling collapse, the most conspicuous symptom is a crown- and root-rotted plant with empty heads, or heads containing small, shrivelled grain at harvest time.

In 1955, the disease attracted attention also in north-western New South Wales and has been studied by Dr. F.C. Butler. He states that the blighted heads are characteristically bleached and show a salmon pink discolouration at the edges of the glumes and at the base of the spikelets. The grain sample is pinched and greyish white to pink in colour. The foot rot phase is characterized by a pinkish discolouration of the stem bases.

McKnight and Butler have conferred on the identity of the Fusarium isolates and now report that they have been identified by Dr. W. L. Gordon, Winnipeg, as F. graminearum, the imperfect stage of Gibberella zeae.

Eyespot of Wheat: Eyespot of wheat (Cercosporella herpotrichoides) was recorded in New South Wales for the first time in 1956 by Dr. F. C. Butler in wheat crops in the Wagga district. The season was abnormally wet and it is probable that eyespot has been present for some years and has escaped detection.

Brown Rot of Apricot as a Latent Infection: There is much of interest to fruit pathologists in a recent paper by Dr. G. C. Wade of Tasmania dealing with latent infection in brown rot of apricots. Evidence is presented that infection of apricot fruit by Sclerotinia fructicola may occur early in the fruit's development but remain latent until ripening commences. Culture studies on green fruit are supported by the results of spraying experiments with fungicides and by inoculation experiments. Latent infection is confined to the epidermis and is not associated with any particular position on the fruit surface. Histological studies indicate that infection takes place through the stomata.

C.J. Magee

NEW ZEALAND NOTES

The Plant Diseases Division together with the Fruit Research Station held an Open Week at the end of February. The Minister in charge of scientific and industrial research opened the display to the public, who were very keen to understand what went on behind the walls of an institution for plant research.

The attendances were very good and the project was very well received, particularly by home gardeners and orchardists, and the local radio station and press gave excellent publicity and praise to the project.

A small boy, after gazing open-mouthed at the exhibits for some time, was heard to remark "Gee! This is worse than Science".

Eradication of Smut Diseases of Cereals

Cereal smut diseases still cause serious losses in many countries, consequently it may be of interest to describe the successful control and elimination of some of these diseases in New Zealand.

Covered Smut of wheat (Tilletia caries and T. foetens), and barley (Ustilago hordei) and loose smut of barley (U. tritici) have been practically eradicated. Loose smuts of wheat (U. tritici) and of oats (U. avenae and U. kolleri) are being kept at a low level of infection in crops.

This control has been achieved by the combined effect of three measures, viz., (1) hot water treatment of all nucleus lines of barley and wheat according to the method developed by Hewlett (N. Z. JOUR. AGR. February, 1930) - presoak of five hours in water at 60° to 70°F., then five minutes in water at 127°, followed by rapid cooling in cold water then drying, (2) the almost universal use of organic mercury seed dusts, and (3) the Certification Scheme for cereals operated by the Department of Agriculture, whereby smut infected lines are rejected.

From an economic point of view the savings in New Zealand do not represent large sums of money because the average annual acreages of wheat, barley, and oats are only 120,000, 55,000, and 40,000 acres, representing 40, 100, and 100 per cent. of our requirements. However, in the large grain-growing countries the savings from control of smut diseases would represent many thousands of pounds annually. Although in N. Z. the industry is organised on a small scale the control measures which have been used are equally applicable to large-scale operation.

The present incidence of cereal smut disease in New Zealand based on field observations over the past four years is as follows:-

Wheat

Loose smut: In the certified wheat crops (grown from hot water-treated seed) over the past four years no loose smut has been found in the pedigree and mother lines, and, in two years, only a trace occurred in the one crop in the standard grade line.

In uncertified crops, a survey over the past four seasons has shown loose smut to be present in 59, 27, 62, and 55 per cent. of the crops examined, and of these only 0, 1, 3, and 6 per cent. were of moderate to severe intensity (5 to 10 per cent. of ears infected).

Covered Smut: Although in 1947 and 1948 between 9 and 17 per cent. of wheat samples contained a trace of infection with covered smut spores, no field evidence of this disease has been since found in New Zealand . (Blair, I. D., N. Z. WHEAT REVIEW, 1956, p. 23.)

Barley

Loose Smut: Hot water treatment of all nucleus lines of malting barley seed in N. Z. was carried out between 1928 and 1932 by the Canterbury Seed Company in co-operation with the Field Mycologist of Plant Diseases Division. (Hewlett, C. H. N. Z. JOUR. AGR. 1927 to 1934.) This programme effectively eradicated loose smut from malting barley crops for twenty years. Between 1933 and 1951 all crops of malting barley were completely free from infection. In 1951-2 season some loose smut was found in malting barley and in the succeeding four years remained in some crops. The top grades (nucleus lines) of all malting barley varieties in N. Z. have been hot water-treated since 1932.

The best grade of Carlsberg seed was imported from Denmark in 1954 and 5 crops grown. The infection present in this line, which was not hot water-treated, was 20 plants per 4 acres. Hot water-treatment in successive years has reduced this infection to 1 to 2 plants per 4 acres. in 1955-6 and 1 plant per 12 acres in the 1956-7 season. The fourth hot water-treatment is expected to give complete eradication of loose smut.

All barley seed of both malting and feed varieties has now been hot water-treated in the top grades for the past two seasons and complete eradication of loose smut is expected next season.

All barley seed sold through seed merchants is treated with organic mercurial dusts. This, together with the hot water-treatment, has been responsible for the

almost complete eradication of covered smut. The disease, however, still occurs in one locality in N. Z. where the farmers persist in keeping their own seed of an obsolete variety. The seed merchants have offered to treat this seed free of charge in an endeavour to complete the eradication.

Eradication of barley loose and covered smuts in N. Z. is facilitated by the fact that all trade in barley is supervised by one firm who arrange contracts, treat the seed, and inspect the crops.

Covered Smut: This disease has been controlled both by hot water-treatment and organic mercury dusting of nearly all lines of barley sown in N. Z. This has been facilitated because all barley seed in the country is handled by one firm.

Oats

Loose Smut and Covered Smut: Unfortunately organic mercury dusting of oat seed is not universally carried out as with wheat and barley, consequently disease is still fairly prevalent.

Wratt (N. Z. J. SC. TECH. Sec. A, 37, 526-534, 1956) found that 50 per cent. of all seed samples developed smut infection when sown in the field. The degree of infection, however, was only between 4 and 7 per cent. of infected heads.

Organic mercury seed dusts have been found to give almost complete control of these oat smut diseases and a campaign to encourage the use of these dusts in N. Z. will be undertaken.

In conclusion, it does appear from the results already achieved that the eradication of cereal smut diseases can be achieved, provided a co-operative effort between plant pathologists, seed merchants, and Seed Certification agencies, is made.

H. C. Smith

NEWS FROM INDIA

Mutation in Colletotrichum falcatum Went Induced by P^{32}: An interesting mutant of Colletotrichum falcatum, the causal organism of red rot of sugar-cane, has been obtained by the use of radio-active phosphorus at the Division of Mycology and Plant Pathology, Indian Agricultural Research Institute, New Delhi. The mutant is a dark type in contrast to the light type parent. The spores of the mutant also differ remarkably from those of the parent culture in being ovate-elliptic instead of the characteristic falcate. They are also considerably shorter in length but are slightly broader.

Line pattern of plum: Line pattern disease of plum, producing yellowing of the veinal net work and chlorosis of leaves, is widely prevelant and severe in the Simla Hills. It has been transmitted by grafting to healthy plums thus indicating its virus nature. The disease appears to be identical with line pattern of plums occurring in U.S.A. and other countries.

Tristeza Disease of Citrus: Investigations carried out at the Indian Agricultural Research Institute on a die-back disease of citrus trees, characterised by pronounced veinal chlorosis, chlorotic spotting, and twig decline, revealed that the disease is of virus origin. In transmission tests by tissue grafting the virus was transmitted to standard sour lemon, sour orange, and West Indian or Key lime.

Small-leaf Disease of Cotton: The disease induces the production of extremely reduced leaves, profuse vegetative growth, and the formation of abortive flowers, resulting in the complete failure of the crop. It has been prevelant in Central India, the Deccan, and in the Punjab. Most Asiatic cottons are susceptible but American and Egyptian are immune. Recently it has been observed at the Indian Agricultural Research Institute that the Indo-American hybrids 134 × CO2; 170 × CO2; (170 × CO2) — 2 (SF); 134 × CO2-M-26 (SF); 3 × (Exotic-3 × Acala 8); 68 × 22 — (SF); BC-68 × 22; and CO-tom-23 (SF) also proved to be completely immune to the virus.

Outbreak of Wheat Rusts: The early outbreak of black and brown rusts of wheat in Peninsular India indicates that if conditions remain congenial the damage caused to the standing crop may be very heavy. An early outbreak of yellow rust has also been reported from the northern districts of Punjab.

Control of Loose Smut of Wheat: At the Mycology and Plant Pathology Division of the Indian Agricultural Research Institute, New Delhi, loose smut of wheat was effectively controlled by soaking the infected seed in 0·1 per cent. Spergon for 17 hours and in copper-free distilled water for 23 hours at 30°C.

New Disease Records from India: Ustilaginoidea virens (Cke.) Tak., which causes false smut disease of paddy, has also been encountered on Zea mays and Chionachne koenigii in India for the first time.

R.S. Vasudeva

NEWS FROM AFRICA

TANGANYIKA

Stem-pitting of Coffee: An unusual condition of Arabica coffee became apparent in mid-1956 in some of the younger plantings at the Coffee Research Station, Moshi; these had recently carried an exceptionally heavy crop. Extensive die-back followed by several deaths did not conform to the usual pattern of 'overbearing die-back' which follows heavy cropping. Instead of the leaves being shed as is customary, they remained, in many cases, attached to the trees on the dead branches. An examination of the roots, stems, and young leaders failed to reveal any fungal or bacterial pathogens.

Pitting Resembling Citrus Tristeza

At a later survey of the affected plantings it was noticed that the lower portions of the stem were swollen, giving them a 'bottle-like' appearance (fig. 1) due to thickening of the bark over a limited region of the stem. Upon removal of this bark, deep pits and furrows were found in the underlying wood cylinder (fig. 2). 'Pegs' of tissue corresponding to the pits protruded from the inside of the bark. The resemblance of the pitting to that caused by the tristeza vrius in some citrus

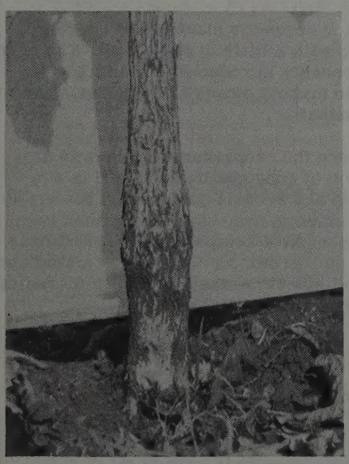

Fig. 1. Base of 3-year-old coffee tree showing 'bottle-like' swelling. (Photo R.G. Tapley).

Fig. 2. Pitting of the wood cylinder in 3-year-old coffee in the region of bark thickening. (Photo R.G. Tapley).

species is very striking. Generally speaking, the more severe the die-back, the deeper and more pronounced was the pitting of the wood. In very young coffee (1-2 years old), gum pockets were found under the bark, apparently preceding the formation of pits.

Recent Occurrence

Stem-pitting and swelling were widespread in plantings made since 1954. A few trees at the Research Station, planted in 1953, were found to have pitting at the top of the main stem, but apart from these the condition was absent from older plantings.

The writer later found this condition of coffee in Kenya, and a wood sample sent from Brazil indicates that the same or a very similar condition has recently occurred there.

Is a Virus Involved?

The wide distribution of stem-pitting and the fact that older plantings in the immediate vicinity of affected trees show no signs of pitting would seem to preclude soil or nutritional factors as the cause of this condition, whilst fungi and bacteria are absent. There remain the possibilities of a 'physiological' upset or a virus.

Sections of stems made by Dr. F.J. Nutman showed that there was considerable disorganisation of the cambium and occlusion of the tracheae but no sign of phloem necrosis. There was acute nuclear abnormality, particularly in the medullary rays where two or more nuclei were present in many of the cells. While there is as yet no direct evidence to support a virus hypothesis for this condition yet cell abnormalities are common in virus infections and the presence of more than one nucleus is at present only known to be associated with virus infections (Nutman, F.J. and Roberts, F.M. EMPIRE J. EXPT. AGRIC., 23, 91-92, 257, 1955).

Sap inoculations from affected to apparently healthy coffee have not produced any characteristic leaf symptoms and it is too early to say whether there will be an ultimate stem reaction. Grafts and trials with dodder as a transmission agent are at present in progress.

E.A. Riley

RHODESIA

Smut of Sugar Cane: Ustilago scitaminea has appeared in plantings at Chirundu, being fairly widespread in Co 331 and Co 419, with a little in N. Co 310. The origin of the outbreak is difficult to trace but was probably introduced in planting setts from another infected estate. It is possible to make a switch to more resistant varieties without causing any serious disorganisation.

Tobacco Diseases: On some of the farms where the crops were at one time devastated by Alternaria longipes healthy tobacco of good quality and yield is now being grown and brown spot no longer presents any serious problem. The variety mostly in favour is Hicks, which is quick to mature. The fertilizer generally in use on these rather heavy, marginal soils has an NPK composition of 2:18:15 and is applied at 500 lb. per acre. Tobacco is now only grown for one year in a land and not for two years in succession as before, but otherwise there has been no radical change in growing methods from the bad days of 'Alternaria'.

G.R. Bates

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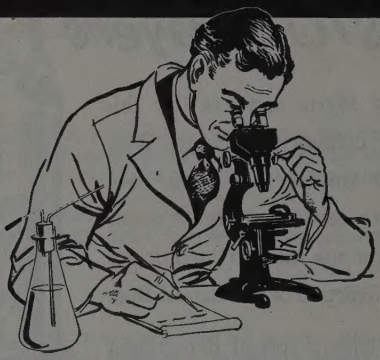

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